

**Vask ja vasesulamid. Mittedeformeeritavast vasesest
valutooted**

**Copper and copper alloys - Cast unwrought copper
products**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 1976:2012 sisaldab Euroopa standardi EN 1976:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 1976:2012 consists of the English text of the European standard EN 1976:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 17.10.2012.	Date of Availability of the European standard is 17.10.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 77.150.30

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

English Version

Copper and copper alloys - Cast unwrought copper products

Cuivre et alliages de cuivre - Formes brutes de coulée en
cuivre

Kupfer und Kupferlegierungen - Gegossene Rohformen aus
Kupfer

This European Standard was approved by CEN on 18 August 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Designations	5
4.1 Material	5
4.2 Product	5
5 Ordering information	6
6 Requirements	7
6.1 Composition	7
6.2 Electrical properties	7
6.3 Hydrogen embrittlement	12
6.4 Scale adhesion	13
6.5 Dimensions, mass and tolerances	13
6.6 Physical condition of refinery shapes	15
7 Sampling	16
7.1 Arrangement of lots for sampling purposes	16
7.2 Inspection lots for analysis and physical testing	16
8 Test methods	17
8.1 Analysis	17
8.2 Physical tests	17
8.3 Rounding of results	18
9 Declaration of conformity and inspection documentation	18
9.1 Declaration of conformity	18
9.2 Inspection documentation	18
10 Marking	18
Annex A (informative) Available products and grades	19
Annex B (informative) Information on electrical resistivity and conductivity relationships	20
Bibliography	22

Foreword

This document (EN 1976:2012) has been prepared by Technical Committee CEN/TC 133 "Copper and copper alloys", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1976:1998.

This is one of a series of European Standards for products manufactured from refined copper grades.

Other products are specified as follows:

- EN 1977, *Copper and copper alloys — Copper drawing stock (wire rod)*;
- EN 1978, *Copper and copper alloys — Copper cathodes*.

In comparison with the first edition of EN 1976:1998, the following significant changes were made:

- a) Clause 3, Terms and definitions for the various refinery shapes have been added from ISO 197-2;
- b) Table 2, Cu-FRHC, Other elements – content has been modified and a new footnote "d" has been added.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 1 "Unwrought copper products" to revise the following standard:

EN 1976:1998, *Copper and copper alloys — Cast unwrought copper products*.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the composition and physical properties of cast unwrought copper products (refinery shapes) in thirteen grades of copper and nine silver-bearing copper grades. The refinery shapes included are horizontally, vertically and continuously cast wire bars, cakes, billets and ingots. Wire bars, cakes and billets are intended for fabricating into wrought products; ingots are intended for alloying in wrought and cast copper alloys.

A table indicating the refinery shapes in which each copper grade is normally available is given in Annex A. Annex B gives information on the relationships between electrical resistivity and conductivity of copper.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1655, *Copper and copper alloys — Declarations of conformity*

EN 10204, *Metallic products — Types of inspection documents*

EN ISO 2626, *Copper — Hydrogen embrittlement test (ISO 2626)*

IEC 60468, *Method of measurement of resistivity of metallic materials*

ISO 4746, *Oxygen-free copper — Scale adhesion test*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 unwrought product refinery shape

general term for unwrought products obtained by refining or melting and casting processes, intended for further processing

EXAMPLE Examples of unwrought products are cathodes, wire bars, cakes, billets, ingots.

[SOURCE: ISO 197-2:1983, 2.1]

3.2 wire bar

cast unwrought product normally of approximately square cross-section, with or without tapered ends, principally used for rolling into drawing stock or flat products for subsequent processing into wire, strip or profile

[SOURCE: ISO 197-2:1983, 2.3]

3.3 cake

cast unwrought product of rectangular cross-section, generally used for rolling into plate, sheet, strip or profiles

[SOURCE: ISO 197-2:1983, 2.4]